ABSTRACT

THESIS: Factors influencing the abundance of sucralose in the Ohio River and the potential for microbial degradation

STUDENT: Benjamin G. Kreitner

DEGREE: Master of Science

COLLEGE: Sciences and Humanities

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The artificial sweetener, sucralose (1,6-dichloro-1,6-dideoxy-β-D-fructofuranosyl-4-chloro-4-deoxy-α-D-galactopyranoside), is increasingly used in the United States as a dietary replacement for table sugar, or sucrose. The compound is stable under a broad range of environmental conditions and readily passes through the human body without being metabolized. Due to the persistent qualities of sucralose, it is expected to accumulate in large river systems that include highly populated areas. The objective of this study was to evaluate the influence of physicochemical, hydrologic, and demographic variables on sucralose abundance in the Ohio River Basin. In addition, we quantified sediment microbial community response to sucralose enrichment to better understand the potential for degradation in the environment. Sucralose was detected at 21 of the 22 sites (81 – 2220 ng/L) and did not differ among Ohio River main stem and tributary sites. Sucralose concentrations were relatively consistent across main stem sites though more variable in tributary sites. Across all sites, sucralose concentrations were correlated with conductivity, water temperature, and gage height. Multiple regression models indicated total drainage area, pH, and dissolved nutrient concentrations (NH_4^+, SRP) were predictors of

sucralose concentrations. Sediment microbial response to sucralose enrichment was mainly a function of sediment C:N content rather than sucralose concentration. Our data show that sucralose is abundant in the Ohio River and sediment microbial communities may have limited potential for biodegradation of this emerging contaminant.